Comparing the average difference, 16·7 per cent., between the marks of the examiners in English essay, with the average difference, 9·5 per cent., for the same boys, between the marks of the medical examiners, it seems fair to conclude that the marks assigned by the latter are at least as trustworthy as those given for English essay, which may be taken as a sample subject in a literary examination.

It is hoped that similar experiments will be undertaken at other places, so that materials may be obtained for the comparison and discussion of different systems of marking, and for the construction, ultimately, of the best systems. Such experiments would be rendered all the more valuable by the introduction of fresh points of examination, and by variations in the method of assigning the marks for the different points.

NOTES.

AT a meeting of the Council of the Royal Society held on October 24, it was resolved that a Committee should be appointed to consider the desirability of raising some national memorial of the late Dr. Joule, and to take such action thereupon as they might think advisable. Sir Henry Roscoe was appointed the provisional Organizing Secretary.

THE Walker Engineering Laboratories in connection with University College, Liverpool, will be opened on November 2. The Lord President and Council of the College will entertain Sir Andrew Barclay Walker, Sir John Coode, the members of the Engineering Committee, and other distinguished guests at luncheon, served in the Walker Laboratories; and in the afternoon a public meeting will be held in St. George's Hall, at which Sir John Coode, President of the Institution of Civil Engineers, will deliver an address, and the annual distribution of medals and prizes will take place. In the evening there will be a reception at the Walker Laboratories, when the formal declaration of opening will be undertaken by the Hon. Lady Walker.

THE annual exhibition prepared by the South London Entomological and Natural History Society was opened at the Bridge House Hotel, London Bridge, S.E., yesterday, and will be open again this evening. These exhibitions have become so popular that on the last several occasions upwards of 2000 visitors have attended each evening.

DR. S. WEIR MITCHELL, of Philadelphia, has been elected President of the Congress of American Physicians and Surgeons, which will meet in Washington in September 1891.

As it is expected that the Forth Bridge will be opened for passenger traffic in the spring of 1890, it is intended that the event shall be celebrated by the holding of an International Exhibition in Edinburgh, specially devoted to electrical and general inventions and industries. The Exhibition is under the patronage of the Queen; and the Marquis of Lothian, Secretary of State for Scotland, is the President. The Vice-Presidents include the Lord Provost of Edinburgh, the Lord Provost of Glasgow, the Lord Mayor (elect) of London, Mr. Edison, and Sir John Fowler. The executive have secured a site of about ninety acres in extent, within easy walking distance of the centre of the town. On Monday, at a special meeting of the Electrical Trades Section of the London Chamber of Commerce, a resolution was agreed to, appointing a Committee to consider the conditions on which it might be advisable to take part in this Exhibition.

A CONVERSAZIONE will be given by the Geologists' Association on December 6.

A STATUE of the French chemist, Nicolas Leblanc, is about to be unveiled at Saint-Denis. Leblanc was born at Issoudun in 1753, and died in 1806. He had a manufactory at Saint-Denis.

THE following Science Lectures will be given at the Royal Victoria Hall during November:—November 5, Mr. A. P. Laurie, on "Dust"; November 12, Mr. W. Furneaux, on "The Heart, and how it beats"; November 19, Prof. Judd, "The Forge of the Blacksmith God"; November 26, Mr. J. E. Marr, "Greenland's Icy Mountains."

THE Morley Memorial College for Working Men and Women, adjoining the Victoria Hall, has begun a very vigorous life. Over 450 students have joined within three weeks of the opening day. In fact they come in with somewhat embarrassing rapidity, and volunteers (both ladies and gentlemen) are urgently wanted, both to teach classes and act as librarians. Six librarians are wanted to take one evening a week each, from 8 to 10. The library has received a valuable present from Mr. Passmore Edwards, who has given 1000 books. Others have given smaller parcels, so that the book-cases which have been provided are quite inadequate, and more are needed.

MR. WILLIAM BURGESS, the founder and proprietor of the Midland Counties Fish Culture Establishment, died on Sunday, at Malvern Wells.

LLOYD'S Agent at the Dardanelles telegraphed as follows on October 28, 9.45 a.m.:—"An earthquake was felt here on Saturday. Very little damage has been done. Sigri Light house, Mytilene, destroyed, also loss of life in island."

PROF. H. G. SEELEY finds that the pubic bone, which is of large size, does not enter into the acetabulum in the Plesiosaurian genus Colymbosaurus from the Oxford Clay. In that genus, the clavicle and inter-clavicle are developed as small separate ossifications, on the visceral aspect of the large scapular arch, and hence are not usually seen.

AT the recent meeting of the Congress of German Men of Science and Physicians at Heidelberg, Herr O. Ammon submitted to the Anthropological Section some interesting results of observations he had made in Baden. These observations related to 5000 soldiers. The tall men had generally long skulls, or skulls of medium length, whereas the short men had round skulls. Most of the round-skulled men came from the Black Forest; the long-skulled usually belonged to the valley of the Rhine, and were especially numerous in towns and in the neighbourhood of the castles of ancient families. From this fact Herr Ammon concluded that the round-skulled men had been the original inhabitants of the Rhine valley, that they had been driven from it by long-skulled invaders, and that the latter had established themselves near the settlements of their victorious leaders. Having shown that there is a certain relation between the height of the figure and the shape of the skull, Herr Ammon went on to indicate the relation between fair hair and blue eyes. No fewer than 80 per cent. of the men with blue eyes had fair hair. He found also that physical growth is generally quicker in the case of the brown-eyed than in that of the blue-eyed type.

AT the last meeting of the Andersonian Naturalists' Society of Glasgow, amongst the papers read was one by Mr. R. Turner Vice-President, on the Uredineæ and Ustilagineæ. He explained the relations of these microscopic Fungi to other plants, and their position in the vegetable kingdom. They are all parasitic upon some living plant, and consist of two essential elements —spores and mycelium. The spores are very diverse, the mycelium very similar. The same mycelium gives rise to several different kinds of spores, each of these being formerly regarded as a different genus. The production of cluster-cups and of the spermagonia, with their so-called spermatia, was described. It was shown that these spermatia have been by no means established as equivalent to pollen in function. As an example of heterœcism, the life-history of *Puccinea graminis* was traced: first, the æcidiospore stage on the barberry, then the rust on wheat, succeeded by mildew, and finally, the germination of the telentospores and the production again of æcidium on barberry. Many other instances of heterœcism were adduced, and some problems suggested for the consideration of members of the Society. The Ustilagineæ were then shortly referred to, and *Ustilago segetum*, the corn-smut, given as a familar example. The paper was illustrated by diagrams, specimens, and the sections shown under the microscope.

IN a paper read before the Royal Danish Academy in February, M. Adam Paulsen gave some interesting particulars of observations made with the object of determining the height of the aurora. Two theodolites were used, the observing telescopes of which were replaced by short tubes having small holes at the eye ends and metallic cross wires at the other ends. Two of the stations were situated in the same magnetic meridian, on opposite banks of the fjord of Godthaab, at a distance apart of 5800·4 metres. The vertical circles of the two theodolites were placed in a common plane by means of observations of "blue fire" signals given at each station. Signals were also exchanged on the appearance of an aurora which it was thought possible to measure, so that simultaneous observations were secured, and it was previously agreed to direct the instruments to the base of the auroral arc. The observations at Godthaab gave heights for different auroræ ranging from 0·6 to 67·8 kilometres. A second series of observations with the same apparatus and methods was made in 1885 by MM. Garde and Eberlin at Nanortalik, near Cape Farewell, the base-line in this case being 1247·8 metres, and the values determined here were 1·6 to 15·5 kilometres. The results obtained by the staff of the Swedish International Expedition at Spitzbergen, with a base of 572·6 metres, range from 0·6 to 29·2 kilometres. These observations therefore lead to the conclusion that auroræ are by no means confined to the highest parts of our atmosphere, but that they occur almost indifferently at all altitudes. In support of this view, M. Paulsen gives accounts of several appearances of auroræ beneath the clouds and the summits of mountains. It is interesting to compare the new values with those given by previous observers. M. Flögel calculated the heights of several auroræ which appeared in the autumn of 1870, and concluded that only the very lowest parts of the aurora came at all within the limits of our atmosphere; he gave the actual limits as 150 to 500 kilometres. For an aurora on October 25, 1870, M. Reimann found a height of from 800 to 900 kilometres, and Nordenskiöld came to the conclusion that the mean height of auroræ was about 200 kilometres. On the other hand, Lemström has observed auroræ as low as 300 metres, and M. Hildebrandsson has seen auroræ in a completely clouded sky. Considering all the facts of the case, M. Paulsen inclines to believe that in the temperate zone, auroræ only appear in the higher layers of the atmosphere, whereas in the auroral zone, properly speaking, the phenomenon is generally produced in the lower layers.

IN the new Quarterly Statement issued on behalf of the Palestine Exploration Fund, it is stated that Dr. Torrance, of the Scottish Mission, has undertaken to conduct a series of meteorological observations at Tiberias for the Fund. Should Dr. Torrance be able to carry out this undertaking, the observations will, with those made at Sarona, now being published by Mr. Glaisher, and those made by Dr. Chaplin at Jerusalem, and reported in the Quarterly Statement for 1883, place the Society after a few years in the possession of materials for a fairly complete account of the meteorology of Palestine. Tiberias is 682 feet below the level of the Mediterranean, and the Society hopes that, as no regular series of meteorological observations has ever been made in such a depressed situation, the results may be exceptionally interesting. As the neighbourhood of Jericho is becoming, to some extent, a place of residence for Europeans, the Society trusts that opportunity may before long present itself for meteorological observations there also.

Symons's Monthly Meteorological Magazine for October contains a climatological table for the British Empire for the year 1888, from which we extract the following interesting details. Adelaide had the highest shade temperature, 107°·5, on December 25, and was the driest station. Winnipeg had the lowest shade temperature, −46°·4, in February, the greatest mean daily range, 22°·5, and the lowest mean temperature, 32°·3. Colombo (Ceylon) had the highest mean temperature, 80°·9, and the greatest rainfall, 101·06 inches. Malta had the least rainfall, 13·75 inches, and was the least cloudy station. The highest temperature in the sun was registered at Calcutta, 165°·4; while London holds the unenviable position of the dampest and most cloudy station.

THE *Annuaire de l'Observatoire Municipal de Moutsouris* for 1889 contains a considerable amount of meteorological information. Observations appear to have been made in connection with every branch of this science, and the tables, showing the results obtained in this and former years, are well constructed; the whole being discussed by M. Léon Descroix, from an agricultural and hygienic, as well as the meteorological, point of view. In addition to this, M. Albert Lévy contributes an elaborate series of analyses of air and water, samples of which had been gathered from various sources; and Dr. Miquel his eleventh memoir on the micro-organisms that are found in them.

MR. JAMES R. GREGORY has issued a catalogue of his valuable collection of meteorites. The formation of this collection was begun nearly thirty years ago, and now Mr. Gregory finds that he can number upwards of 300 distinct "falls," "which," he says, "really places my collection among some of the largest in Europe as regards the number of falls, and in the average weight and excellence of the examples." As to arrangement, he has adopted, with a few variations, the principle of the new Catalogue of the British Museum collection in chief.

IT has been generally supposed that the mango weevil infests the pulp of the fruit, but in a letter read at a recent meeting of the committee of the Agri-Horticultural Society of Madras, from Mr. C. I. Denton, forwarding specimens of mangoes, called by the Canarese the bee mango, he states that the peculiarity of the fruit is that the stone contains a bee existing on the kernel. Specimens of the insect were forwarded by the Madras Agri-Horticultural Society to Mr. Coates, of the Indian Museum, who identified them as *Cryptorhynchus mangifera*, the mango weevil, whose normal habitation is in the pulp of the fruit, and not within the stone. The fruit sent to the Society was carefully examined, and the pulp was, in every case, free from the insect, which was only discovered when the stones from which the pulp had been removed were broken open.

A THIRD edition of Mr. Thomas Greenwood's "Free Public Libraries" is being prepared. Three years ago, when the first edition of this work was published, the total number of adoptions of the Acts during thirty-six years was only 133. At present there are 190.

A BOOK on "The Birds of Essex," by Mr. Miller Christy, is to be published by subscription. It will form the second volume of the "Special Memoirs" of the Essex Field Club. The author has been collecting materials for this work for more than fifteen years, and he says that 271 species of birds are described as having been met with in Essex—a number which has been exceeded hitherto by very few other counties.

WE have received the official report of the proceedings of the thirty-seventh meeting of the American Association for the

Advancement of Science, held at Cleveland in August 1888. The volume, we need scarcely say, contains addresses, reports, and papers of great interest. The Presidential address, delivered by Prof. S. P. Langley, is on the history of our present views about radiant energy.

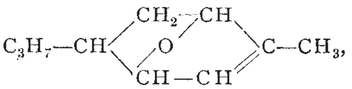
THE latest issue of the Proceedings of the Royal Society of Edinburgh (Session 1888–89) includes pp. 257–320 of vol. xvi. The following are the contents:—On the relation among the line, surface, and volume integrals, by Prof. Tait; the development of diarthrodial joints in birds and mammals, by David Hepburn; electrification of air by flame, by Sir Wm. Thomson; on the placentation of the halicore dugong, by Prof. Sir William Turner; on the geographical distribution of some tropical diseases, and their relation to physical phenomena, by R. W. Felkin (with 16 plates); quaternion note on a geometrical problem, by Prof. Tait; the solubility of carbonate of lime in fresh and sea water, by W. S. Anderson.

THE thirteenth part of Cassell's excellent "New Popular Educator" has been issued. It includes a good coloured plate representing the Rosegg glacier.

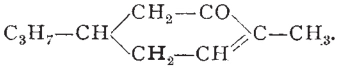
THE Glasgow and West of Scotland Technical College has issued its Calendar for the year 1889–90. We have received also the new Calendar of the University College of Wales, Aberystwith.

AN interesting paper on Japanese lacquer, read lately by Mr. R. Hitchcock before the Chemical Society of Washington, has been printed in the Proceedings of the United States National Museum. Japanese lacquer is the product of a tree, the *Rhus vernicifera*, D.C., which grows throughout the main island of Japan. It attains a large size, the trunks sometimes measuring a metre in diameter. It is said the tree will live for forty years, but only comparatively young trees are valued for the production of lacquer. Having yielded for several years they are cut down, the lacquer extracted from the branches, and young trees take their places. Having given an account of the chemical composition of lacquer, and described the uses to which it is applied, Mr. Hitchcock urges that it should receive more attention than has hitherto been devoted to it by manufacturers in America. "It gives a surface to wood," he says, "much harder than our best copal varnish, without brittleness. It takes a polish not to be excelled, which lasts for centuries, as we may see in the old treasures of Japan. It is proof against boiling water, alcohol, and, indeed, it seems to be insoluble in every agent known. It is the best possible application for laboratory tables. I have a set of photographer's developing trays that have been in use for more than a year, and I find them excellent and cheap. In Japan it is used for many household articles." Unfortunately, lacquer poisoning from the fresh material is a serious danger. According to Rein, the poison is a volatile acid, and Mr. Hitchcock suggests that it might be removed by a heat that would leave the lacquer uninjured.

AN isomer of camphor, $C_{10}H_{16}O$, has been prepared by Drs Wallach and Otto in the chemical laboratory of the University of Bonn (*Liebig's Annalen*). This new substance is a liquid, to which the name pinol is provisionally given, possessing a very strong camphor-like odour. It is obtained by the action of hydrochloric acid upon a well-cooled mixture of turpentine oil, glacial acetic acid, and ethyl nitrite. The hydrochloric acid is gradually added in the form of a concentrated solution, and its addition is followed by the separation of crystals of the nitroso-chloride of pinene, one of the terpenes, and the formation in the solution of pinol, the new camphor. The whole is allowed to stand for about twelve hours at a low temperature to complete the precipitation of the first-named body, after which the crystals are filtered off, and the filtrate is subsequently distilled in steam. A rapid evolution of gas occurs at the commencement of the distillation, after which the pinol is quietly conveyed over in the steam. The distillate separates into two distinct layers, and the aqueous layer is readily separated by means of a funnel. The dried distillate is then freed from acetic ether by fractional distillation, and the higher boiling portion again distilled in steam. This redistilled product is similarly separated from water, dried, and finally itself subjected to fractional distillation: when the principal fraction, consisting of pinol with a small quantity of impurity, passes over between 182° and 188° C. The liquid thus obtained is found to possess in a very marked degree the odour of camphor, and it can be freed from the last traces of impurity by taking advantage of the action of bromine upon it. Bromine yields with pinol a beautifully crystalline dibromide, $C_{10}H_{16}OBr_2$. On diluting the distillate, therefore, with twice its volume of glacial acetic acid, and running in a thin stream or drops of liquid bromine, the colour of the latter rapidly disappears, and, on evaporating, splendid rhombic crystals of this dibromide are obtained. In order to recover the pinol in a pure state from the recrystallized dibromide, about a hundred grams of the latter are boiled with excess of alcoholic potash for a whole day, and the product distilled in steam, separated from water, dried with solid potash, and repeatedly fractionally distilled. Finally, pure pinol is obtained, boiling constantly at 183–84°. Analyses of this product conclusively point to the formula $C_{10}H_{16}O$, the same as that of ordinary camphor. Its constitution is proved to differ, however, from the latter body by the nature of its oxidation products. Both potassium permanganate and dilute nitric acid oxidize it to carbonic anhydride, oxalic acid, and terebic acid, $C_7H_{10}O_4$. The only possible constitution compatible with these facts is



while ordinary camphor is generally assumed on Kekulé's authority to possess the constitution



An extremely interesting fact about pinol is that its nitroso-chloride readily reacts with β-naphthylamine to form a base of the formula $C_{20}H_{24}N_2O_2$, isomeric with quinine. This is the first base of this empirical formula which has yet been artificially prepared. Solutions of both the base and its salts present similar fluorescent phenomena to those of quinine and its salts.

THE additions to the Zoological Society's Gardens during the past week include a Gaur (*Bos gaurus* ♂) from Pehang, Malay Peninsula, presented by Sir Cecil C. Smith, K.C.M.G.; three Blue-crowned Hanging Parrakeets (*Loriculus galgalus*) from Malacca, presented by Mr. A. Baker; a Short-tailed Capromys (*Capromys brachyurus*) from Cuba; two Reed Buntings (*Emberiza schœniclus*), British, purchased; three Dingo Dogs (*Canis dingo* ♂ ♂ ♀), a White Goshawk (*Astur novæ-hollandiæ*), a Berigora Hawk (*Hieracidea berigora*), a Brush Turkey (*Talegalla lathami* ♀), an Australian Thicknee (*Œdicnemus grallarius*) from Australia, received in exchange.

OUR ASTRONOMICAL COLUMN.

THE NATAL OBSERVATORY.—The Report of this Observatory for 1888, which has recently come to hand, is a somewhat meagre one, and is chiefly occupied with the routine daily meteorological observations. The small record of astronomical work achieved may perhaps be explained by the circumstance that the Superintendent, Mr. Nevill, has recently been appointed Government Chemist and Official Assayer for Natal, that a laboratory was erected for him in the early part of the year, and that he has already commenced his official duties in his new capacity.

Of direct astronomical work the Report only records the